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GEOPHYSICAL ABSTRACTS

NO. XXXIX

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DEPARTMENT OF COMMERCE - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS[1]

No. 39

Compiled by Frederick W. Lee[2]

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1. GRAVITATIONAL METHODS

(841) ÜBER NORDDEUTSCHE SALZSTÖCKE, IHRE GENESIS UND TEKTONIK; BEZIEHUNGEN ZWISCHEN DER FORM UND DEM GRADIENTENBILD DER DREHWAAGENMESSUNG

(CONCERNING THE NORTH-GERMAN SALT-DOMES, THEIR GENESIS AND STRUCTURE; RELATIONS BETWEEN THE FORM AND THE GRADIENT PICTURE OBTAINED BY TORSION BALANCE MEASUREMENTS)

By Dr. Krusch

Kali, Halle (Saale), vol. 26, No. 5, 1932, pp. 51-56.

A discussion of the formation of salt domes in northern Germany is given in the first part of this article.

The importance of their discovery not only for the establishment of oil-bearing regions but also for the determination of tectonic lines and systems in the subsoil is mentioned. About 70 salt domes were discovered in north Germany.

The second part of the article deals with geophysical methods of prospecting for oil, especially with torsion balance measurements, by the interpretation of which typical forms of salt domes may be determined with a sufficient accuracy necessary for starting the boring tests. A few examples of these typical forms are examined.

From his observations carried out by torsion balance the author draws the conclusion that the gradient directions which often can not be explained must not be assigned to incidental causes, but must be completed by additional measurements until a geologically reasonable picture is obtained.--W. Ayvazoglou.

(842) NEW PENDULUM FOR PROSPECTING

Editorial note

The Petroleum World, London, vol. 29, No. 378, 1932, p. 92.

The attention of prospectors attracted by a device produced in the Paris Academy of Sciences, which may well prove useful in oil prospecting, is mentioned.

The apparatus, designed by M. Holweck and M. Lejay, is a new elastic pendulum for the measurement of gravity. The pendulum consists of a vertical rod about 4 inches long, terminating at its lower end in an elastic blade set in a fixed base. The elasticity of the spring is so calculated as to give an oscillation duration of about one second. The measurement, with an approximation of 1/10 second of the duration of about 1,000 oscillations, records gravity with a precision of two parts in a million.

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To deal with errors resulting from friction, temperature, etc., required the use of distinct kinds of materials: The oscillating rod is of cast quartz, which lengthens by less than 1/1000 of a millimeter when temperature rises by 30° C.; the spring is made of elinvar, a metal the elasticity ratio of which is almost invariable with temperature; the pendulum is inclosed in a glass bulb welded to a ferro-chrome cylinder in which there is a high vacuum. The damping of oscillations is thus so reduced that the amplitude, after 900 oscillations, is still 33 per cent of its original value. The pendulum is observed through refraction prisms and reflecting microscope. For the measurement of time, a pocket chronometer with the usual double overlapping second hand is sufficient.

The process has been checked by measurements along the Paris-Corsica route and back, operations in Paris after the trip giving exactly the same results as on departure.--W. Ayvazoglou.

(843) DREHWAGE-MESSUNGEN AN DER AMERIKANISCHEN GOLFKÜSTE UND IHRE GEOLOGISCHE BEDEUTUNG

(TORSION BALANCE MEASUREMENTS ON THE AMERICAN GULF COAST AND THEIR GEOLOGIC IMPORTANCE)

By Walter Kauenhowen

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 83, No. 10, 1931, p. 731.

Below is given a translation of Kauenhowen's abstract from a paper presented at the meeting of the German Geologic Society held in November, 1931, concerning torsion balance measurements carried out under the direction of the author from 1928 to 1931 in the southern States of the United States:

Schweydar's torsion balances with photographic registration were used for the measurements. The instruments answered entirely the requirements of field service with regard to their sensitivity and construction. The execution and organization of the work was explained and illustrated by photographs; the results of the investigations of a series of various tectonic disturbances were discussed.

The following examples were illustrated by gravity pictures and geological profiles: Synclines, anticlines, soles, faults, grabens, salt domes, and magmatic intrusions. Among other results the southern boundary of the East Texas oil field, the largest in the world at the present time, was determined by gravimetrical method. The influence of these various disturbances upon the gradient, curvature value, and isograms was explained and the importance of the results of measurements for the oil geology was stressed.--W. Ayvazoglou.

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(844) RELATIVE SCHWEREMESSUNGEN IN ERDÖLGEBIETEN

(RELATIVE GRAVITY MEASUREMENTS IN OIL-BEARING REGIONS)

By H. Gornik

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 83, No. 9, 1931, p. 666.

A lecture on the relative gravity measurements in oil-bearing regions was delivered by Gornik before the German Geological Society in September, 1931.

The following questions were discussed: The difference in importance for practical geologic purposes of gradient measurements carried out by the torsion balance on the one hand, and of determinations of relative gravity values carried out by the Sterneck pendulum on the other hand.

The principle of pendulum measurements and the simplified formula for the difference of the gravity values at two different stations. The necessary reductions of values determined by measurements. The importance of the reductions as based on examples from the practice. Results of pendulum measurements carried out in various regions in Germany (106 stations, 6,300 square kilometers), Egypt (12 stations, 200 square kilometers), Oklahoma (392 stations, 11,000 square kilometers), and Texas (89 stations, 40,000 square kilometers). Description of the original Sterneck apparatus and of an apparatus with photographic registration and wireless connection between the central station and field station as developed during the last years.

The importance for the German oil industry of pendulum measurements for the determination of the tectonic large structures of the north German lowland and of the structures between the salt domes. Review of pendulum stations in the whole world since 1808, about 4,800 stations in total, 600 of which belong to the Seismos Co., Hannover, and are situated in the oil-bearing regions.--Author's abstract translated by W. Ayvazoglou.

(845) ON THE STRESSES IN THE EARTH'S CRUST REQUIRED TO SUPPORT SURFACE INEQUALITIES

By Harold Jeffreys

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, No. 1, January, 1932, pp. 30-41.

The maximum stress difference found in Darwin's problem below a surface elevation of the form a cos kx, was 0.736 $g\delta a$, where δ is the density of the uppermost rocks. It has been found that if there is no restriction on the vertical distribution of strength, it is possible to support a similar elevation with stress differences nowhere exceeding about 0.68 $g\delta a$. The stress

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differences are distributed through a greater range of depth than on Darwin's theory, and attain their maximum at three different places, one of which is at the outer surface below the greatest elevations and depressions. This makes it possible to understand how fractures can extend up to the free surface, where, on Darwin's theory, there is no stress difference.

The stresses in a crust of variable thickness, resting on a denser material devoid of strength, are also considered. The stress difference in the crust can in these conditions be made nowhere greater than $g\delta a$, but such a distribution can not be improved. It requires that the mass per unit area down to a given surface in the lower layer, parallel with the spheroid (not the geoid) shall be constant, and is therefore consistent with Airy-Heiskanen isostasy. There is a disturbance of gravity in the lower layer, so that the equipotentials immediately below the interface are not strictly spheroidal. The support of inequalities in any other conditions will require greater stress differences in the lithosphere. In the most favorable case there is no vertical stress across vertical planes, so that the crust may be considered as if made of blocks floating independently.

It appears that minimum estimates of strength already made from the height of visible inequalities and the variation of gravity at geoid level are still approximately correct.

The elastic stresses in a floating crust due to disturbance of the outer surface by denudation or deposition over areas much wider than the depth of the crust are known to be much greater than $g\delta$ times the additional elevation or depression. The development of such features will take place in three stages. In the first, so long as the disturbance is not too great, the stress differences in the asthenosphere will not exceed its strength, and Darwin's theory, or the modifications referred to in this article, will apply. In the second the disturbance becomes great enough to produce yield in the asthenosphere and the stress differences in the lithosphere are accordingly increased to those appropriate to elastic yield in a floating crust. In the third the stress differences in the crust itself come to exceed its strength, and yield in the crust keeps pace with deposition or denudation, so that $g\delta a$ never exceeds the strength of the material.--Author's abstract.

(846) THE HYPOTHESIS OF ISOSTASY

By J. de Graaf Hunter

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, No. 1, January, 1932, pp. 42-51.

The following conclusions regarding the Hayford hypothesis of isostasy are drawn from the article:

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1. The Himalayan regions so far explored gravitationally exhibit gravity anomalies which are greatly reduced by the hypothesis, and indicate an average of 90 per cent compensation. The average departure from Hayford compensation may be represented by an equivalent stratum 864 feet thick of ordinary surface rock (density 2.67) in excess.

This is strong support for the hypothesis of mountain compensation in accordance with Pratt and Hayford.

2. (a) Strong support for Hayford's hypothesis has been found in the United States over an area 0.9 per cent of the surface of the globe.

(b) Large departures from Hayford's hypothesis, numerically equivalent to over 1,000 feet of surface rock, have been found to characterize continental India, over an area of 0.5 per cent of the surface of the globe.

(c) Very large departures from Hayford's hypothesis have been found in the vicinity of the Dutch East Indies. A large systematic negative anomaly exists over an area of 0.25 per cent of the surface of the globe. The magnitude of this anomaly appears to average at least 0.100 cm. sec.$^{-2}$, and is equivalent to a thickness of 2,980 -- say 3,000 feet of rock of density 2.67.

The areas dealt with are small considered as percentages of the earth's surface; they represent, however, most of the available evidence. They show that:

0.9 per cent of the surface strongly supports Hayford's hypothesis.
0.75 per cent of the surface strongly denies the hypothesis.

The fair conclusion seems to be that regions exist where the hypothesis closely resembles facts, but that regions also exist where precisely the reverse is the case. With less than 2 per cent of the earth's surface gravitationally explored, it is useless to conjecture what proportion of the earth accords with the hypothesis. There is no "principle of isostasy" in the sense that has often been implied, that is, of Hayford compensation; and it is misleading to use this term. We can not presume that Hayford compensation has actuality in any region unless we find by measurement that it has. We certainly can not compute the form of the geoid by assuming Hayford compensation, with any chance of success.

On the other hand, we can use the concept of Hayford compensation as an ideal standard, with reference to which gravity anomalies may be stated. In so doing we gain distinct computational advantages. Our anomalies will thereby very probably be freed of the disturbing effects of mountain ranges, etc., at great and medium distances; and even if on occasion this is not the case, no harm is done. We shall know what our standard of reference is, as this is quite definitely defined, just as the size and location of our reference spheroid is defined.

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There may well be a "principle of isostasy" in the vaguer sense in which Dutton introduced the word isostasy. I think this could almost be expressed by changing the old expression "water finds its own level" into "the earth's crust finds its own level." Surely it is merely a mechanical concept that the natural tendency of the material of the crust is to adjust itself toward hydrodynamical equilibrium, to which it may approximate more and more with lapse of time, but which it will never absolutely attain owing to the resistive strength of the materials of the crust. One would, indeed, be surprised if the ordinary laws of mechanics and of strength of materials were suspended in the earth's crust.

But it is the artificial, though useful, and restricted sense of Hayford compensation, in which the compensating densities are for convenience arranged in vertical columns of uniform density anomaly, that the term "isostasy" has come to mean, and the "principle of isostasy" accordingly implies the existence of Hayford isostasy over the whole earth -- which is in opposition to the observed facts.--Author's abstract.

(847) NOUVEAU MODÈLE DE PENDULE HOLWECK-LEJAY. VALEUR DE LA GRAVITÉ EN QUELQUES POINTS DE LA FRANCE CONTINENTALE ET EN CORSE

(A NEW MODEL OF HOLWECK-LEJAY PENDULUM. GRAVITY VALUES AT SEVERAL PLACES IN FRANCE AND IN CORSICA)

By F. Holweck

Comptes Rendus de l'Academie des Sciences, Paris, vol. 193, No. 26, 1932, pp. 1399-1401.

Improvements made in the new model of the Holweck-Lejay pendulum by which its sensitivity was greatly increased are enumerated. Two series of six measurements each were made in the observatory in Paris in order to prove the sensitivity of the new apparatus. Besides, field measurements were carried out in August and September, 1931, with the same purpose. A table showing the values of "G" observed at a series of stations between Paris and Corsica is given. After returning to Paris the first measurement taken in Paris before the departure was checked and in both cases the same value was obtained.--W. Ayvazoglou.

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2. MAGNETIC METHODS

(848) ON THE DETERMINATION OF THE HORIZONTAL COMPONENT OF THE EARTH'S MAGNETIC FIELD BY A COUPLED OSCILLATIONS METHOD

By L. G. Vedy

Proceedings of the Cambridge Philosophical Society, vol. 28, Part 1, 1932, pp. 109-114.

An account is given of a simple experiment designed to illustrate quantitatively the phenomena of coupled oscillations. Two similar small magnets are suspended in the earth's magnetic field at a suitable distance apart so that there is appreciable magnetic interaction between the two oscillatory systems. Under the conditions employed, the equations of motion reduce to a simple form, and the experiment may be used as a method of measuring the intensity of the horizontal component of the earth's magnetic field.--Author's abstract.

(849) ÜBER MAGNETISCHE STÖRUNGEN DIE AN SÜDNORWEGISCHEN NORDLICHTTAGEN IN POTSDAM BEOBACHTET WURDEN

(ON MAGNETIC DISTURBANCES WHICH WERE OBSERVED IN POTSDAM DURING THE AURORA BOREALIS DAYS IN SOUTH NORWAY)

By A. Rœstad

Geophysical Publication, Oslo, vol. 9, No. 3, 1931, 30 pp.

In this paper the author presents the results of a statistical study of magnetic disturbances. The work is divided into two parts: (a) Relation between the aurora and magnetic disturbances, and (b) special characteristics of magnetic disturbances.

The auroral data consisted of measurements of the angle Θ published by Störmer for auroral observation in southern Norway during 1911-22, Θ being the angle between the earth's magnetic axis and some prominent point in the aurora as seen from the center of the earth. The magnetic disturbing forces were computed from the records of Potsdam and Tucson. The curves representing the relation between Θ and the intensity of magnetic disturbance show naturally an increase in Θ with increase in magnetic activity, but for Potsdam the curve is rectilinear whatever the type of aurora (rays, arcs, or diffused arcs), while for Tucson the curve is of a parabolic type. The author believes that this was to be expected from theoretical considerations.

For the study of special characteristics of magnetic disturbances, hourly values of the disturbing force P were computed for 144 disturbed days between 1891 and 1922. The force P is referred to three rectangular axes with origin at the point of observation, one axis being parallel to the earth's magnetic axis, the second perpendicular to the magnetic axis, and the third perpendicular

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to the other two. The components of P along these axes are respectively P_a, P_r, and P_c. The 144 disturbed days are divided into seven groups according to intensity of disturbance. With these data a variety of investigations are carried out: Namely, diurnal-variation curves of P are developed for different intensity groups, also diurnal-variation curves of P_a/P, P_r/P, and P_c/P, diagrams showing momentary frequency distributions of direction of disturbing force, diagrams showing diurnal variations of the projections of the angle $\cos^{-1} P_a/P$ (Θ and Ψ) on the two vertical coordinate planes, curves representing the relation between Θ and P_a, and finally curves resulting from a study of irregular short-period fluctuations. The author contributes a full and interesting discussion of the diagrams, pointing out their noteworthy features and attempting to discover their physical meanings.--W. F. Wallis! abstract reprinted from the Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 37, No. 1, 1932, p. 92.

(850) ERGEBNISSE REGIONAL-MAGNETISCHER FORSCHUNG IN DER EIFEL

(RESULTS OF THE REGIONAL MAGNETIC INVESTIGATIONS IN THE EIFEL)

By H. Reich

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 83, No. 9, 1931, pp. 646-653.

Measurements carried out at the first-class stations had shown unusually great change in the difference of the vertical intensity between Potsdam and the Rhineland. The isodynamic lines of the vertical intensity suffered great warpings during the last 30 years which probably were caused by deep magnetic processes.

The regional surveys in the region of the Neuwieder basin resulted in finding positive anomalies in SSW-NNE direction in the western part of the basin; these anomalies followed about the axis of the Siegen layers. The west parts of the Eifel Valley and the southeast parts of the region of the Hunsruck slates were marked by negative anomalies.

An unusually strong magnetic disturbance was established in the Hohen Venn in the region to the west and north of Monschau. The form and extension of this anomaly makes it possible to draw a conclusion that this anomaly is probably caused by the influence of a magnetic edge-face of Plutonic granite (Lammersdorf-granite).--Author's abstract translated by W. Ayvazoglou.

(851) ERGEBNISSE ERDMAGNETISCHER UNTERSUCHUNGEN IM VULKANGEBIET DES LAACHER SEES IN DER EIFEL

(RESULTS OF EARTHMAGNETIC INVESTIGATIONS IN THE VOLCANIC REGION OF LAKE LAACH IN THE EIFEL)

By W. Ahrens

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 83, No. 9, 1931, p. 667.

The purpose of these measurements consisted of determining the distribution of the basaltic lava streams, the extension of which below the thick

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overburden of trachytic tuffs could not be established in other ways. It was proved that this was possible even in the region with the most thick tuff overburden (more than 30 meters). Difficulties in following the direction of the lava streams were probably caused by the interruption of the streams; the explanation of these interruptions was possible only in single cases. On the other hand, some peculiarities in the structure of the streams could be disclosed by diagrams. Extraordinary strong anomalies were produced by basaltic slag masses, that is, by volcanic matter (Vulkanbauten) from which the lava streams originated; these anomalies were greater than those above the lava streams (sometimes to 6,000 γ).

Besides, it was established, to the contrary of measurements made in other regions (for example, schalstein in the Lahn-Dill region), that some tuffs, basaltic as well as trachytic, as long as they contain sufficient amounts of magnetic iron and are of corresponding magnitude, produce very great disturbance values, sometimes of about 1,000 γ, in places where the rocks appeared in the form of mountain tops.--Author's abstract translated by W. Ayvazoglou.

(852) INTERPRÈTATION GÉOLOGIQUE DE MESURES MAGNÉTIQUES DANS LE BASSIN DE PARIS

(GEOLOGICAL INTERPRETATION OF MAGNETIC MEASUREMENTS IN THE BASIN OF PARIS)

By J. P. Rothé

Comptes Rendus de l'Académie des Sciences, Paris, vol. 191, No. 23, 1930, pp. 1144-1146.

The purpose of the work carried out by Rothé consisted of showing how an anticline perfectly determined by geological survey can be interpreted magnetically. Two places were investigated.

1. The anticline of Bray County. Isolines were drawn based on profiles obtained from magnetic survey. According to the interpretation of the results it was shown that the presence of the geologic anomaly could be proved only in places where ferruginous sands and sandstones were outcropping. The magnetic anomaly disappeared with the disappearance of these guiding deposits.

2. Magnetic anomaly in the basin of Paris. Numerous measurements with the vertical variometer were carried out by the author in the region of Rambouillet-Houdan in order to determine exactly the form of the anomaly discussed and studied by Moureaux. According to the results the values of the anomaly obtained were smaller than those given by Moureaux. In comparing the results of magnetic surveys carried out in 1896-1904 and in 1924 the differences could not be assigned to hazard, as the region where the decrease was the highest was just that with the maximum anomaly.

Based on the results obtained it was shown that there was no relationship between the anomaly and the folds of the overburden in the basin of Paris.--W. Ayvazoglou.

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(853) BERÄKNING AV MAGNETISKA MALMERS DJUPGÄEDE

(CALCULATION OF THE DEPTH OF FERROMAGNETIC ORES)

By Th. Dahlblom

Jernkontorets Annaler, Stockholm, vol. 115, No. 2, 1931, pp. 95-102.

One of the poles of an ore magnet appears always to be situated close to the deepest point of the orebody, irrespective of the relation of dip and strike to the magnetic field of the earth. If the position of the lower pole can be determined, the approximate depth of the ore is consequently known. At a sufficient distance from the ore, the magnetic field may be considered to be approximately equal to that of an ideal magnet, and the author describes several methods by which the poles of the ore magnet may be found through measuring the direction of the field at different points on the surface. The best results are obtained by using curves drawn through points where the angle between the direction of the magnetic field and the axis of the magnet has the same value.--Author's abstract.

3. SEISMIC METHODS

(854) CONSTRUCTION OF MASTER MECHANICAL OSCILLATOR FOR TESTING SEISMIC RECORDERS AND OTHER ALLIED APPARATUS

By F. W. Lee and G. A. Irland

U. S. Department of Commerce, Bureau of Mines, Washington, D. C., Technical Paper 518, 1932, 17 pp.

Contents of the article:

1. Introduction.
2. Acknowledgments.
3. Specifications.
4. Scale of measurement.
5. Construction.
6. Principle of operation.
7. Electrical measurement of vibrational displacement.
8. Oscillator recorder.
9. Materials for constructing oscillator recorder.
10. Optical measuring system.
11. Method of manipulation.
12. Measurement of constants of vibrator.
13. Measurement of constants.
14. Tabulation of constants of master vibrator.
15. Discussion and results.
Appendix. Elementary mathematical relations controlling vibration of table.

Fifteen illustrations are added to the article.

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The article contains investigations carried out by the authors for studying mechanical vibrations from the viewpoint of seismic exploration as well as from the limit of strength a structure may offer to blasting operations.

The necessity to have available a suitable master oscillator or vibrator with which to calibrate the field apparatus is dictated by the fact that seismograms, before they can be used to contribute real information concerning geophysics and the nature of vibrations, should be expressed in some absolute system of measurement. Records of different instruments at different stations should be directly comparable. It is therefore necessary to recheck or calibrate at various intervals these instruments to ascertain if they have retained their accuracy of calibration.

Concluding the last item "Discussion and results," the authors say:

> Mechanical systems free from linkages having vibrational rigidity are especially well suited for mathematical analysis of this nature. That building structures, units, etc., should fall into this class is purely coincidence. It is suggested that the c.g.s. system, on account of its intrinsic simplicity, be adopted in describing these relations and that the mechanical definitions which arise have a nomenclature similar to that used at present in the electrical science.

From the relation

$$A = \frac{\frac{F}{\omega}}{\frac{K}{\omega} - M\omega + jr} = \frac{\text{Force per unit angular velocity}}{\frac{K}{\omega} - M\omega + jr}$$

the system may be reduced to one of linear fractional transformation of the straight line $\frac{K}{\omega} - M\omega + jr$ into a circle having a diameter $\frac{1}{r}$, allowing a simple graphical visualization of the amplitudes and phase relationship, the variable parameter being the angular velocity of frequency when the factor $\frac{F}{\omega}$ is held constant.--W. Ayvazoglou.

(855) A SMOOTHING DEVICE APPLIED TO THE NEW SEISMOLOGICAL TABLES

By L. J. Comrie and Harold Jeffreys

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, No. 1, January, 1932, pp. 10-13.

The revised tables of transmission times of P and S, recently given by Jeffreys (Geophys. Abs. 32, p. 313), were provisional in the sense that there was some outstanding uncertainty about their behavior near 20°; this uncertainty has been considerably reduced (Geophys. Abs. 36, p. 420) by showing that the formulas used up to 17.5° required to have their cube terms doubled. Beyond 20° the times were empirical, except that small corrections had been

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applied at a few distances to satisfy the theoretical condition that the second differences must always be negative. But there were still irregularities outstanding, and there was a doubt as to the mode of transition between 20° and 30°. Attempts have been made to remove these, but have been given up on account of the danger of introducing systematic error. A method of smoothing devised during the preparation of the tables for interpolation appears to remove these difficulties. It rests on the principle that the second differences are to vary as smoothly as possible.

This device has been applied in the present paper. The method is exhibited in two tables. The final results are shown in a table.

The authors conclude, however, "That if there are real differences between different earthquakes these will have been hidden by the process of averaging. Systematic differences of the order of 5$ may be expected between the travel times of continental and oceanic earthquakes, on account of the difference in the structure of the upper layers. The detection and elucidation of these must await further enquiry."--W. Ayvazoglou.

(856) THE DETERMINATION OF THICKNESSES OF THE CONTINENTAL LAYERS FROM THE TRAVEL TIMES OF SEISMIC WAVES

By A. W. Lee

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, No. 1, January, 1932, pp. 10-13.

A novel method is given for analysis of the connection between time of origin of an earthquake, the depth of focus, apparent times of starting of the seismic waves, and the thicknesses of the layers through which they travel.

Application of the method to the available data for an earthquake near Imotski, Yugoslavia, on 1923 March 15, shows that the focus was near the bottom of the granitic layer. The approximate thicknesses of the layers are determined as 1 kilometer of sedimentary material, 11.5 kilometers of granite, and between 22 and 33 kilometers of intermediate rock.

The travel times of the waves from the shocks in Jersey on July 30, 1926, and in Herefordshire on August 15, 1926, indicate that the thicknesses of the granitic and basaltic layers were 14 and 15 kilometers, and that the foci were 10 and 6 kilometers respectively below the top of the granite.--Author's abstract.

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(857) THE NORTH SEA EARTHQUAKE OF 1927, JANUARY 24

By A. W. Lee

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, No. 1, January, 1932, pp. 21-30.

Contents:

1. Introduction.
2. Data.
3. Determination of epicenter.
4. The normal P and S waves.
5. Other waves.
6. Depth of focus and time of origin.

Author's summary reads as follows:

Data given in the International Seismological Summary for the North Sea earthquake of January 24, 1927, have been supplemented by measurements of the original seismograms for Dyce, Edinburgh, Stonyhurst, Copenhagen and Kew, for determination of the epicenter and study of the phases recorded. The epicenter is located as $59^{\circ}.4$ N., $2^{\circ}.9$ E., with time of origin $5^{h}\ 18^{m}\ 11^{s}$.

Times of transmission for the P and S phases may be represented closely by the formulas:

$$T_p = 5^h\ 18^m\ 22^s + 14.21\Delta - 2.00\ (\Delta/10)^3$$
$$T_s = 5^h\ 18^m\ 17^s + 25.50\Delta - 3.50\ (\Delta/10)^3$$

A number of measurements indicate other waves with velocities 7.0 km./sec. (P_Q) 4.0 km./sec. (S_Q) and 3.6 km./sec. (S^*).

The focus was situated near the bottom of the granitic layer.--W. Ayvazoglou.

(858) OUR PRESENT KNOWLEDGE CONCERNING THE INTERIOR OF THE EARTH

By James B. Macelwane

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 21, No. 4, 1931, pp. 243-250.

This paper was presented at a meeting of the Eastern Section of the Seismological Society of America, June 11 and 12, 1931. The author started the discussion on the structure of the earth with Mohorovicic's account of the Kulpa Valley earthquake of October 8, 1909, in southern Europe, in which the latter found it necessary to postulate two layers in the structure of the earth's crust in order to account for the successive impulses he observed in the first phase. The discussion on the development of the knowledge concerning the interior of the earth was then continued based on the extensive literature published on this question. A list of references mentioned by the author during the discussion is added to the article.--W. Ayvazoglou.

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(859) FILLING THE GAPS IN THE SEISMOLOGICAL PROGRAM

By N. H. Heck

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 21, No. 4, 1931, pp. 261-267.

In the first part of this article Heck enumerates the seismological stations installed in the Caribbean region as a whole and says that although all these stations are important in connection with the study of this region it is necessary that other high-grade stations be added either by the replacement of instruments at existing stations or by the establishment of new ones.

The main part of this article deals with the seismological problems of the continental United States. In examining the instrumental situation the author points out a number of important gaps yet to be filled.

Some problems to be solved are discussed, such as: The number of stations required, types of instruments to be selected, need for a limited number of vertical-component seismometers at selected stations, the very serious question of providing the stations with trained personnel, developing entirely new types of instruments, etc.

The author concludes that although we may feel greatly encouraged at the progress that has been made, a determined effort must be made to fill the gaps in the program that have been described, as well as others that may exist or that may develop.--W. Ayvazoglou.

(860) MODIFIED MERCALLI INTENSITY SCALE OF 1931

By Harry O. Wood and Frank Neumann

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 21, No. 4, 1932, pp. 277-283.

The formation of a satisfactory earthquake intensity scale has long been a subject for consideration and discussion among those who are interested actively in studies of shock intensity and its geographic manifestation.

The Rossi-Forel scale which has been in wide use for many years has become inadequate for present-day needs.

The scale proposed here by the authors is a modification and condensation of the Mercalli-Cancani scale as formulated by Sieberg (A. Sieberg, "Erdbebenkunde", pp. 102-104, Jena, 1923), worked out at the Seismological Laboratory in Pasadena, Calif. The scale presented in this article has been accepted, after some changes and additions, by organizations and individuals in the United States active in seismological work. The U. S. Coast and Geodetic Survey will use it in the publication of its seismological results for 1931.--W. Ayvazoglou.

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(861) ACCURATE RECORDS OF STRONG EARTHQUAKE MOTIONS

By N. H. Heck

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 21, No. 4, 1931, pp. 285-288.

Although a number of institutions and organizations, as well as the National Government, have included in their program the observation of distant earthquakes and of light to moderate near-earthquakes, and also the collection of reports of visible and felt effects of strong earthquakes, nothing has been done, according to the author, in the precise instrumental measurement of strong earthquake motions, especially in the cases in which damage has occurred.

In this article the author outlines a number of principles which have been developed by him through study of the problems and through conferences in order that the situation may be understood.--W. Ayvazoglou.

(862) THE P CURVE AND THE S CURVE RESULTING FROM A STUDY OF THE TANGO EARTHQUAKE, JAPAN, MARCH 7, 1927

By Ernest A. Hodgson

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 22, No. 1, 1932, pp. 38-49.

The records of the Tango earthquake, for which the coordinates of the epicenter and the origin time are well defined and whose focus is shallow, furnish data which define the P curve with considerable precision to an epicentral distance of about 8°. From that point to 50° the curve is fixed in position by very few points. The values given by Byerly for the Montana earthquake have influenced the author in placing the curve as reported for this range. Such a placing is demanded also, to some extent, by the earlier and the later parts of the curve. As so placed, it lies considerably below the Mohorovicic-Macelwane P curve for much of the range, the maximum difference being about nine seconds. It is certain that the latter curve gives P-O intervals much too great near the center of this range, but it would be desirable to make a detailed study of some other earthquake whose epicentral position, origin time, and depth of focus could be well defined and for which the last named would be shallow, the earthquake being so situated that well-equipped stations would register the disturbance for distances within this range.

From 50° to 60° the control is better, but there are still too few points to fix its position as definitely as could be desired. From 60° to 100° there are many control points of considerable strength. This section of the P curve seems fixed in position within narrow limits. Data for distances beyond 101° are lacking.

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Footnotes to the tabulations for both the P curve and the S curve are given in some detail as showing the relative strength of controlling points.

In the case of the S curve, there seems to be no well-defined departure from the curve published in mimeographed form by Macelwane in 1926. The footnotes explain outstanding departures from this curve. It may be said that the Tango earthquake data support the previously published S curve to within the limits of accuracy of the observations.--Author's abstract.

(863) RICHMOND QUARRY BLAST OF SEPTEMBER 12, 1931, AND THE SURFACE LAYERING OF THE EARTH IN THE REGION OF BERKELEY

By Perry Byerly and Karl Dyk

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 22, No. 1, 1932, pp. 50-55.

The authors describe in this article the results of a quarry blast carried out near Castro Point, Richmond. To place the charge a horizontal shaft 63 feet long, 5 feet wide, and 4 feet high was dug into the base of the 300-foot cliff face. At its end was driven a cross shaft, 163 feet in length, along which the charge of 32.5 tons of 10 per cent Judson blasting powder was placed. It was estimated that 300,000 tons of rock were loosened. The resulting earth shock was recorded at Berkeley on the two Wood-Anderson seismographs.

The interpretation of the records is given. The various arrivals of the waves are shown in a figure. Speeds of 4.44 kilometers per second for the P wave and 2.37 kilometers per second for the S wave were established. The ratio of speeds for P and S is thus 1.87, which indicates that Poisson's ratio for this medium is 0.3. This value is not inconsistent with that given by Nagaoka for sandstones. P and S also were recorded which had speeds of 5.6 and 3.1 respectively. These are recognized values for granite. It is therefore concluded that granitic rocks underlie this region and that these waves have penetrated into it for part of their paths.--W. Ayvazoglou.

(864) TESTING OF PHOTOGRAPHIC RECORDERS

By H. E. McComb

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 22, No. 1, 1932, pp. 56-59.

The operation of the optical system used in the tests is described as follows: A straight-filament galvanometer lamp is mounted about 1 meter from the face of the recording drum to be tested. The filament of the lamp is adjusted so that it is parallel to the axis of the drum and to the axis of a short-focus cylindrical lens mounted just in front of the lamp. The light

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which passes through this lens is brought to focus on the face of the drum and forms an enlarged image of the lamp filament. The cylindrical lens of the recorder is then interposed in its regular position and the rays brought down to a very fine line. The light is flashed at regular intervals by means of a shutter operated by a break-circuit chronometer.

Sections of two of the records made with two different recorders are shown in two figures.--W. Ayvazoglou.

(865) DEVELOPMENT OF SEISMOLOGICAL INSTRUMENTS AT THE BUREAU OF STANDARDS

By Frank Wenner

Bulletin of the Seismological Society of America, Stanford University, Calif., vol. 22, No. 1, 1932, pp. 60-67.

In this article Wenner describes the construction of an accelerometer assigned for use within the destructive area of major earthquakes. This instrument may be adjusted to, and it is expected that it will be used with, a period of one-tenth of a second or possibly somewhat less.

A photograph of the accelerometer is given.--W. Ayvazoglou.

(866) A PORTABLE SEISMOGRAPH FOR RECORDING ARTIFICIAL EARTHQUAKES

By J. H. Jones and D. T. Jones

Journal of Scientific Instruments, London, vol. 9, No. 1, 1932, pp. 8-17.

A portable seismograph for recording artificial earthquakes is described. The motion of the pendulum is magnified by means of an arrangement of two small magnets and a soft iron element suspended on a phosphor-bronze strip which is attached to the pendulum.

The coupling of the magnifying system to the pendulum introduces a couple which opposes the restoring moment of the pendulum and lengthens the periodic time of the seismograph. Other important features of the instrument are the absence of friction from the magnification linkage and simple methods for the remote control of the "zero," the period, and the sensitivity. An experimental investigation of the relation between the period and sensitivity is described.

The instrument has been thoroughly tested, under difficult field conditions, by the geophysical staff of the Anglo-Persian Oil Co. (Ltd.), during seismic surveys in the oil fields of southwest Persia.

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Three typical seismograms obtained with the instrument are shown.

Contents:

1. Introduction.
2. Description of the instrument: (a) The pendulum; (b) the magnetic method of magnifying the pendulum motion; (c) remote control of zero position; (d) remote control of the period and sensitivity; (e) the damping of the free movement of the element and pendulum.
3. Theoretical considerations: (a) Condition for maximum pendulum magnification; (b) effect of the size of the cone on the magnification.
4. Experimental investigation of the sensitivity and period of the seismograph: (a) The magnification of the pendulum; (b) the magnification due to the magnet system; (c) the effect of the magnet system on the period of the pendulum; (d) the effect of varying the tension of the suspension.
5. Test of seismograph in the field.--W. Ayvazoglou.

(867) SISMOGRAPHE ENREGISTREUR ASKANIA À TROIS COMPOSANTES, DESTINÉ À LA MESURE DES VIBRATIONS DES CONSTRUCTIONS

(ASKANIA THREE-COMPONENT RECORDING SEISMOGRAPH ASSIGNED FOR MEASURING THE VIBRATIONS OF BUILDINGS)

Editorial note

Le Génie Civil, Paris, vol. 100, No. 8, 1932, pp. 193-195.

The description of the Askania 3-component recording apparatus based on Schweydar's principle is given in this article. The apparatus constructed in collaboration by Prof. Hort and Angenheister has been improved by Askania Works which reduced the defects of its construction to a minimum by introducing optical transmission and amplification of oscillations, as well as by proper choice of the relation between the levers and the dimensions of the oscillating systems. A longitudinal section of the seismograph and diagrams recorded on a Diesel motor are added.--W. Ayvazoglou.

(868) ÜBER OBERFLÄCHENWELLEN

(CONCERNING SURFACE WAVES)

By Tokunosuke Itoo

Gerlands Beiträge zur Geophysik, Leipzig, vol. 35, No. 3/4, 1932, pp. 349-356.

Mathematical discussion on the surface waves is given under the following headings:

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1. Fundamental equations concerning surface waves.
2. Surface shearing waves.
3. Relationship between the absorption coefficients and viscoelastic coefficients.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(869) ÜBER EIN GEOLEKTRISCHES SCHÜRFVERFAHREN ZUR INDIREKTEN BESTIMMUNG DER DECKEN- UND FLOZMACHTIGKEIT

(ON A GEOELECTRICAL METHOD OF PROSPECTING FOR DETERMINING THE THICKNESS OF THE OVERBURDEN AND THE THICKNESS OF THE LAYER)

By W. Stern

Braunkohle, Halle (Saale), vol. 31, No. 9, 1932, pp. 149-152.

In this article the author gives a description of the physical foundations of a geoelectrical method of prospection, its operation and the apparatus used. The description is based on the results of the practical application of the method carried out during 1930 and 1931 in the lignite mines "Gruhlwerk and Beisselsgrube" of the "Rheinische Aktien-Gesellschaft für Braunkohlenbergbau und Brikettfabrikation."

The apparatus, a diagram showing schematically the method of connection used for measurements, as well as two resistance diagrams based on which the depth-profiles of the Gruhlwerk mine and Beissel mine were determined are given.--W. Ayvazoglou.

(870) EIN NEUER SCHULZESCHER ERDINDUKTOR

(A NEW SCHULZE'S EARTH INDUCTOR)

By R. Bock

Zeitschrift für Instrumentenkunde, Berlin, vol. 52, No. 2, 1932, pp. 85-86.

The article describes a new construction of the earth inductor, as designed by Schulze's precision measuring instrument shop and the author, by which some inconveniences in determining the magnetic inclination, especially by taking field measurements, are eliminated.

A photograph of the instrument is given.--W. Ayvazoglou.

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(871) ELECTRICAL CORING BY THE DETERMINATION OF BOTTOM-HOLE DATA

By C. and M. Schlumberger and E. G. Leonardon

The Petroleum Times, London, vol. 27, Nos. 688 and 689, 1932, pp. 307-308 and 355-357.

This article is a summary of Technical Publication 462, 1932, 38 pp., issued by the American Institute of Mining and Metallurgical Engineers. An abstract of Technical Publication 462 is given in Geophysical Abstracts 35, p. 392.--W. Ayvazoglou.

(872) ELECTRICAL CORING: DETERMINING BOTTOM-HOLE DATA BY ELECTRICAL MEASUREMENTS

By C. and M. Schlumberger and E. G. Leonardon

The Petroleum World, London, vol. 29, Nos. 378 and 379, 1932, pp. 98-100 and 122-124.

This is an article published by the authors from a paper presented before the American Institute of Mining and Metallurgical Engineers in New York and issued as Technical Publication 462 in 1932. Authors' abstract of this publication is given in Geophysical Abstracts 35, p. 392.--W. Ayvazoglou.

(873) INSTRUMENT FOR MEASURING CORROSIVE PROPERTIES OF SOIL

By E. R. Shepard

The Oil Weekly, Houston, vol. 61, No. 11, 1931, p. 30.

As a result of the study of corrosion of underground pipes it was found that soils high in soluble salts, and therefore low in electrical resistivity, are usually highly corrosive to pipe lines. In this connection, Shepard developed an instrument for a simple and quick measurement of the electrical resistivity of soil.

In this article the description of the Shepard earth-resistivity meter is given. The meter consists mainly of two rods or canes tipped with iron electrodes; a flashlight battery and milliammeter are mounted in a light aluminum frame on one of the rods. The rods are pushed into the earth with a separation of about 1 foot or more, the circuit is closed, and the resistivity of the soil is read directly in ohm-centimeters on the scale of the instrument. The manner in which polarization has been overcome or minimized has been accomplished by making the cathode very much larger than the anode, as shown in the accompanying figure.--W. Ayvazoglou.

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(874) DRILLING PROVES EXISTENCE OF METEORIC MASS

By C. H. Wilson

The Mining Journal, Phoenix, vol. 15, No. 23, 1932, p. 7.

A brief account of the geophysical examination of Meteor Crator and the results obtained was published by the Mining Journal of April 15, 1931 (see Geophys. Abs. 25, p. 127). In the present article information is given on the results of two drill holes completed by the Meteor Crator Exploration & Mining Co.

The existence of a mass of meteoric material at the depth and location indicated by the previous geophysical examination of the crater was proved.--W. Ayvazoglou.

5. RADIOACTIVE METHODS

(875) ZUM PROBLEM DER RANDSTÖRUNGEN BEI IONENMESSUNGEN

(CONCERNING THE PROBLEM OF EDGE-DISTURBANCES IN CARRYING OUT IRON MEASUREMENTS)

By H. Israel

Gerlands Beitrage zur Geophysik, Leipzig, vol. 35, No. 3/4, 1932, pp. 341-348.

Measurements of ions carried out according to the condenser method result in errors caused by the inhomogeneity of the electrical field at the ends of the condenser. These errors may be calculated if they are supposed to be caused by an hypothetical condenser with homogeneous field, joining directly the condenser. The "methods of charging and discharging" (Auflade-und Entlademethode) give different disturbances, the hypothetical condenser will also be different in both cases. Two constants of the disturbances a and i are given, allowing a correction of the measured number of ions and of their mobility for both methods; their reciprocal value represents a direct measurement of the magnitude of the disturbance. It is shown that the method of discharging is preferable for counting the ions, and the method of charging for measuring the mobility.--Author's abstract.

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(876) DIE ELEKTRISCHEN ZÄHLER FÜR KORPUSKULARSTRAHLEN

(ELECTRIC COUNTERS FOR CORPUSCULAR RAYS)

By Georg Stetter

Verhandlungen der Deutschen Physikalischen Gesellschaft, vol. 12, No. 2, 1931, pp. 26-29.

In a lecture delivered at the meeting of the Austria association in Vienna held on June 8, 1931, the author discussed the methods of counting the corpuscular rays (Quantenelektrometer, Röhrenelektrometer and Stossionisationszahler). Principles of operation and the limits of the effects produced by each instrument were compared.--W. Ayvazoglou.

6. GEOTHERMAL METHODS

(877) RELATION OF EARTH TEMPERATURES TO GEOLOGIC STRUCTURE

By John A. McCutchin

The Oil Weekly, Houston, vol. 65, No. 2, 1932, pp. 21-26.

The purpose of this research has been to determine the possibility of using temperature data for the location of future oil pools, particularly in areas where the generally used geological and geophysical methods meet with little success.

Detailed temperature surveys have been made by the author in over 300 wells located in 40 oil fields of Oklahoma and Kansas. While the relations in any field in these areas are practically the same, the relations of earth temperatures to geologic structure in the Dilworth field of Kay County, Okla., has been chosen to illustrate the possibilities of using earth temperatures to locate oil fields. A brief history of the study of earth temperatures and a description of method and apparatus are given. According to two parts of a plate added to the article, a marked relation between geologic structure and the present observed position of the isothermal surfaces in the south dome of the Dilworth field is shown.

The author concludes: "The results of the temperature observations made in the Dilworth field and in many other fields of Oklahoma and Kansas indicate that this problem has commercial possibilities as a new geophysical method of locating buried structure. It is to be remembered, however, that all these observations have been made in proved fields and abandoned wells and until the method has been tried in a new area, either by making temperature observations in core drill holes or drilling wells, it will remain as a possibility and not as a proved fact."--W. Ayvazoglou.

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7. UNCLASSIFIED METHODS

(878) CHOICE OF GEOPHYSICAL METHODS IN OIL PROSPECTING

By E. Degolyer

The Petroleum Times, London, vol. 27, No. 694, 1932, pp. 493-494.

The four methods developed, in the author's opinion, to the point of having any claim to practicability in oil prospecting are: The magnetic, gravimetric, electrical, and seismic methods.

Concerning the choise of the method, the author's opinion is that in the present state of development of the geophysical methods for areas where the occurrence of oil pools is controlled by normal folding, the results obtained from seismic surveys, reflection method, are more definite and of greater value than any other type of geophysical information available. A survey of this type is regarded better than any results secured by other methods.

The second choice for all areas, and first choice for areas in which the seismic methods are not usable, would be the gravimetric method.--W. Ayvazoglou.

(879) THE SEARCH FOR OIL IN AUSTRALIA AND DR. WOOLNOUGH'S REPORT

By Frederick G. Clapp

The Petroleum World, London, vol. 29, No. 378, 1932, pp. 75-76.

In this article Clapp gives some remarks on the document entitled "Report on tour of inspection of the oil fields of the United States of America and Argentina, and on oil prospects in Australia," by W. G. Woolnough, geological adviser to the Commonwealth Government (see Geophys. Abs. 37).

Regarding geophysics, to which, according to Clapp, Woolnough pays but a small measure of attention, probably for the reason that the subject is a dangerous one for public consumption, and because more highly technical knowled is needed for its comprehension than with regard to perhaps any branch of the subject he covers, Clapp, in the paragraph "Use of geophysics," points out that this science should never be used except where designated by a geologist, shoul never be used broadly except in such definite areas as recommended for the purpose, and its determinations should always be passed upon by a geologist experienced in interpretation of such data. Under proper guidance, what appears to the novice to be a meaningless array of lines, arrows and figures on a map or graph, becomes of positive value, and often enables drilling on the crest of a buried structure that otherwise would remain unknown.--W. Ayvazoglou.

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(880) LA PROSPECTION ET L'ORGANISATION DE LA PRODUCTION DES MINES, . . PARTICULIEREMENT DANS LES COLONIES

(PROSPECTING AND ORGANIZATION OF PRODUCTION IN MINES, ESPECIALLY IN THE COLONIES)

By Ch. Berthelot

Le Genie Civil, Paris, vol. 99, Nos. 21 and 22, 1931, pp. 522-524 and 554-556.

After a brief remark on the necessity of providing France with minerals which can be obtained from its colonies, the author discusses in the first part of this article the general methods of prospecting which may be used for this purpose. In addition to geological survey the possibility of application of geophysical methods (gravimetric, magnetic, electrical, and seismic) is explained.

The second part of the article deals with the methods of the organization of production.--W. Ayvazoglou.

(881) NEUE METEOROGRAPHEN FÜR DRAHTLOSE FERNÜBERTRAGUNG

(NEW METEOROGRAPHS FOR RADIO TRANSMISSION OF RECORDS)

By Ludwig Heck and Günther Sudeck

Gerlands Beiträge zur Geophysik, Leipzig, vol. 31, No. 1/3, 1931, pp. 291-314.

For the meteorological research of altitude, automatic transmission of the recording of the instruments from a pilot balloon is necessary. By this way the results of the recordings will reach the observer with certainty and without delay. The measured values of air pressure, temperature, and moisture must be transmitted by wireless from the pilot balloon to the ground station.

Two instruments corresponding to the requirements of weight and insensibility to cold are described. The working of both is the following: The angular deflection of the pointer is transformed by scanning with a rotating contact in an impulse. The period of the impulse is proportional to this angle.

This impulse is radiated from a small short-wave transmitter. At the receiving station on the ground this impulse-period is retransformed in a deflection of the recording instrument.

A simple telephotographic receiver is especially adapted as recording instrument. The indications are automatically recorded and the diagrams can be observed during the ascension. The two sending instruments differ from

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each other in the way of scanning the measured values. The one instrument works with a rotating contact, controlling the wireless transmitter directly in the plate circuit of the transmitting valve. The other instrument uses a light ray for scanning the measured values, controlling the transmitter by a selenium cell as a variable grid leak. Very light batteries insensible to cold are used.

The experiments in the laboratory, as well as with kite and balloon ascensions, will be continued. The valuation and precision of the diagrams will be published.--Authors' abstract.

(882) GEOPHYSICAL PROSPECTING

By T. H. Laby

Nature, London, vol. 129, No. 3259, 1932, p. 579.

The author, who is one of the editors of "The principles and practice of Geophysical prospecting" (see Geophys. Abs. 28, p. 214) (the other editor being A. B. Broughton Edge), publishes in this note the correction of an error which has crept into the discussion of field tests at Tallong, N. S. Wales, given on page 229 of the book:

> In fig. 176 the east and west indicators have been accidentally interchanged. The same figure indicating the interpretation placed on the geophysical work shows the existence of a mass of alluvium over a mile wide and upwards of 200 feet deep. In the geological map of the Tallong area, reproduced on page 228, no such deposit of anything approaching to this extent and thickness is shown, though the omission of a geologist to indicate such a mass of material would be very serious. As a matter of fact, the deposit is mostly decomposed granite in situ. The mistake in representing this as alluvium is obviously due to the fact that decomposed granite transmits seismic waves comparatively slowly, as would alluvium - namely, at the rate of about 3,000 feet per second. Actually there is outcropping granite over this portion of the area, as shown in the geological map. The use of the term "alluvial velocities" as a general expression for the velocity of a wave through incoherent material is apt to be misleading, and might be discontinued.
>
> In fairness to the geologists who surveyed this area years ago, it must be admitted that the geophysical interpretation, while accurately classifying the material according to the velocities of the transmitted waves, was inaccurate in its presentation of the geological structures of the Tallong area.--W. Ayvazoglou.

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8. GEOLOGY

(883) VARISZISCHE ZÜGE DER SCHWEREVERTEILUNG IM GEBIRGSBAU SÜDWEST-UND MITTELDEUTSCHLANDS

(VARISTIC LINES OF GRAVITY DISTRIBUTION IN THE STRUCTURE OF MOUNTAINS OF SOUTHWEST GERMANY AND CENTRAL GERMANY

By Rudolf Herrmann

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 83, No. 10, 1931, pp. 701-731.

Contents:

1. The problem of the latent gravity surpluses.
2. Geological position of the latent gravity surpluses.
   a. Lower Silesia and Lower Lausitz.
   b. East Harz-foreland.
   c. Kraichgau, Franken, and Lorraine.
3. Interpretation.
4. Conclusions.
   a. Gravity and structure of the varistic mountain system.
   b. Disappearance of the varistic gravity.
5. Summary of the main results.
6. Literature.

The figures added show: (1) The relation between the tectonic and gravimetric types; (2) a tectonic map of the southeastern surroundings of the Harz; (3) the places of the Alpine-type gravity distribution in the varistic rocks; (4) the Permian eruptive rocks of the varistic underground layers represented in the Wolff's quartz triangle.--W. Ayvazoglou.

(884) NOTIZEN ZUR ÖLGEOLOGIE UND SALZTEKTONIK

(NOTES CONCERNING OIL GEOLOGY AND SALT TECTONIC)

By Karl Krejci-Graf

Petroleum Zeitschrift, Berlin, vol. 27, No. 48, 1931, pp. 893-897.

The following notes concerning oil geology and salt tectonic are given by the author in this article:

1. The deepest boreholes in the world.
2. The deepest productive boreholes in the world.
3. Boreholes in the sea.
4. Apparatus for measuring the inclination of boreholes.

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5. Geophysics -- the use of seismographs in boreholes for determining deep structures is mentioned. A few figures showing the number of salt domes discovered by geophysical methods of prospecting in the Gulf Coast are given.
6. Gas-oil ratio.
7. Oils which are heavier than water.
8. Gas in subrecent layers.
9. Density rule of oils.
10. Distribution of oil and water.
11. Movement of the edge water.
12. Uncommon secondary rocks.
13. Salt tectonic.--W. Ayvazoglou.

9. NEW BOOKS

(885) Alexanian, C. L. Traité pratique de prospection géophysique (Practical treatise on geophysical prospecting). For the use of geologists and mining engineers. 1932, 268 pp., 133 figs., 2 plates. Price: Fr. 62; additional postal charges, in France, Fr. 2.50, Foreign countries, Fr. 5.50 and Fr. 8.00. Librairie Polytechnique Ch. Beranger, 15, Rue des Saints-Pères, Paris. Contents: Introduction -- general rules; Part 1: Direct procedures. Chapter I, Gravimetrical method of prospecting; II, Magnetic method; III, Electrical method (natural currents); IV, Geothermal method; V, Radioactive method; VI, Seismic method; VII, Electrical methods: (1) By measuring electrical potentials; (2) electromagnetic method; (3) by using Hertz's waves. Part 2: Application of geophysical methods of prospection and geological interpretation of the results of measurements. Chapter I, Comparative study of various methods of geophysical prospecting; II, Practical application of the torsion balance; III, Practical application of magnetic method of prospection; IV, Application of electrical method (natural currents); V, Application of geothermal method of prospecting; VI, Application of radioactive method of prospecting; VII, Application of seismic method of prospecting; VIII, Practical application of electrical methods of prospecting. This is a handbook designed to guide the operator in the field and the geologist in the interpretation of the results obtained by measurements.

(886) Berliner, A., and Scheel, K. Physikalisches Handwörterbuch (Handdictionary of physical terms). Julius Springer, Berlin, 1932, 2 Auflage VI and 1,428 pp., 1114 figs.; price, R. M. 96. Geophysical terms are considered.

(887) International Research Council. Third report of the Commission appointed to further the study of solar and terrestrial relationships. Percy Lund, Humphries and Co., London, 1931, V - 132 pp.
This is the third of the reports of the Commission to the International Research Council, the first two having been printed and circulated in 1926 and 1929. The report proper, covering the first three pages, deals briefly with the following topics: Publication of the second report,

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constitution of the committee, bulletins of daily character figures for solar phenomena, the proposed International Polar Year of 1932-1933, daily magnetic character-figures, memoranda on recent progress, and ultraviolet solar radiation. The remaining 129 pages of the publication contain 40 articles by various authors, of which the following may be mentioned as of especial interest: S. Chapman, Solar influences on the Earth's magnetism and on the upper atmosphere; L. d'Azambuja, Sur l'observation des phenomenes eruptifs dans le chromosphere solaire et leurs relations avec les orages magnetiques; H. W. Fisk, Magnetic secular variation and solar activity; J. A. Fleming, Researches of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington bearing on solar activity and the earth's magnetic and electric fields; W. M. H. Greaves, Discussion of the Greenwic solar and magnetic data; R. Gunn, Review of certain contributions to solar and terrestrial magnetism; L. Harang, Memorandum on investigations of aurora at Nordlysobservatoriet (Auroral Observatory), Tromso; E. O. Hulbu The ultraviolet-light theory of aurorae and magnetic storms; V. A. Kostitzin, On the relation of magnetic agitation to solar activity; M. et MMe. H. Labrouste, Composantes periodiques de l'activite solaire et composantes correspondantes dans le magnetisme terrestre; J. C. McLennen, On the auroral green line; D. H. Menzel, Auroral phenomena and the solar chromosphere; E. T. Stetson, The correlation of solar and lunar phenomena with the ionization of the earth's atmosphere; C. Stormer, Auroral research.

Professor S. Chapman, the first chairman of the commission, and himself a successful worker in this field, deserves high credit for editing these reports. By inviting the investigators to contribute summaries of their work, he has made the reports fairly complete compendia of the status of our knowledge regarding solar and terrestrial relationships. That this is a distinct help to individual research as well as to collaboration is obvious, considering the fact that the papers on this subject are scattered in physical, geophysical, astronomical, and meteorological journals.

The report is neatly reproduced by the planograph method, which, on account of convenience and economy, is now becoming more widely used for publications of this character. H. D. Harradon's review reprinted from Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 37, No. 1, p. 91, 1932.

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10. PATENTS

(888) PROCESS OF AND APPARATUS FOR LOCATING MINERAL DEPOSITS IN SUBSURFACE EARTH STRATA

Thomas S. West, of Drumright, Oklahoma

United States patent 1,845,379. Patent issued February 16, 1932.

The invention relates to an apparatus for locating ore, oil, gas and other mineral substances embodying an electrode adapted to be lowered into a well by an insulated conductor and into electrical connection with a desired stratum, means for insulating said conductor and electrode from a desired portion of the well's wall, means for measuring the magnitude, phase relations, and other characteristics of electric current electrically connected at a point distant from the well with the stratum through a different earth stratum, means connected to the measuring means for regulating the current, and means connected between the regulating means and the conductor for producing an electrical potential difference there between.

Claims allowed - 5.

(889) METHOD AND APPARATUS FOR DETERMINING DISTANCE BY ECHO

Reginald A. Fessenden, of Chestnut Hill, Massachusetts.

United States patent 1,853,119. Patent issued April 12, 1932.

The invention relates to method and apparatus for locating the position of objects by echo, particularly their distance and direction; it includes especially the receipt of such echo by means of a flash of light in connection with a scale whereby observations may be secured from which the distance from a station to the object to be located may be determined.

Claims allowed - 12.

(890) IMPROVEMENTS RELATING TO SEISMOGRAPHS, AND APPLICABLE TO OTHER MEASURING INSTRUMENTS

Anglo-Persian Oil Co., (Ltd.), a British Joint-Stock Corporation, and John Hugh Jones of Hastings, County of Sussex.

British patent 323,552. Patent issued January 9, 1930.

This invention relates to means for indicating or recording small displacements and for indicating or registering minute electrical currents. Means for measuring small displacements or minute electrical currents applicable to

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seismographs and other measuring instruments, wherein an iron armature is suspended in a direction transverse to a rapidly varying magnetic field having strongly curved lines of force in such manner that it will take up a position parallel, or nearly parallel, to the tangent to a particular line of force at any particular point, so that on relative movement of the armature and the source of the magnetic field, or on distortion of the magnetic field, the armature will take up a new position.

Claims allowed - 6.

(891) IMPROVEMENTS RELATING TO SEISMOGRAPHS, AND APPLICABLE TO OTHER MEASURING INSTRUMENTS.

Anglo-Persian Oil Co. (Ltd.), of London, a British Joint-Stock Corporation, and John Hugh Jones, Ph.D., of Hastings, County of Sussex.

British patent 343,917. Patent issued February 23, 1931.

This invention relates to an improvement in or modification of the invention described in Specification No. 323,552 and consists in an improved construction of the magnetic magnifier by which greater sensitiveness of operation may be secured.

According to the invention, the magnetic field is produced by a plurality of magnets so disposed that the lines of force in which the magnetic element is set are not only strongly curved but also concentrated to a greater intensity. Moreover, means may be provided, for example, in the form of coils applied to one or more of the magnets, whereby the magnetic field may be controlled as to intensity or direction and may be distorted at will.

Claims allowed - 7.

(892) A PROCESS FOR DETERMINING THE POTASSIUM CONTENT IN SPACES CONTAINING POTASSIUM

Werner Kolhörster of Berlin-Friedenau, Germany.

British patent 340,231. Patent issued December 12, 1930.

The present invention relates to a device for determining the potassium content in spaces which contain potassium compounds in any state of aggregation whatsoever, comprising a tubular ionization vessel with an electrode passing through the same, and having a potential of about 1,000 volts or upwards set up between these two parts, the ionization vessel being affected by the gamma radiation emitted by the potassium so that owing to the high potential difference existing between the outer wall and the inner electrode, an intense ionization by collision is set up so that each incoming ray produces, in an outer circuit, current shocks of such intensity that they are recorded on a recording strip either directly or after amplification has taken place, or are added up by a counting device.

Claims allowed - 1.

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(893) IMPROVEMENTS IN APPARATUS FOR DETERMINING POTASSIUM CONTENT IN SPACES CONTAINING POTASSIUM

Werner Kolhörster of Berlin-Lichterfelde, Germany.

British patent 351,266. Patent issued June 25, 1931.

This invention relates to an improvement or modification of the invention set forth in Patent Specification No. 40,231.

According to the present invention, the improvement or modification consists of the fact that the apparatus for determining the potassium content includes a rotating impulse relay in the form of a rotative selector as used in automatic telephony, or a continuous current electrical meter, adapted to summate and indicate current impulses of high frequency, as produced by the ionization set up by the gamma rays emitted by the potassium. Preferably, means is provided whereby the current impulses to be summed and indicated are first amplified.

Claims allowed - 9.

(894) METHOD AND APPARATUS FOR DETECTING MINERAL AND OTHER DEPOSITS

Doctor Günther Laubmeyer of Kassel-Wilhelmshöhe, Germany.

British patent 352,269. Patent issued July 9, 1931.

The method according to the invention consists in collecting underground air by means of a special apparatus and in testing it quantitatively as to the existence of gaseous substances which are in direct relation with the deposits. The apparatus used for working the method is constructed with the purpose of not giving any possibility of interchange with the open air to the underground air which has been collected by parts of the apparatus.

The apparatus is constructed as a closure or lid for borings, the lid having besides an outlet pipe at least one cylinder or the like surrounding the outlet pipe; the diameter of this cylinder being larger than that of the borehole. A particularly preferred construction which has been found very practicable contains two concentrically arranged cylinders, is provided with an outlet pipe and closes the borehole tightly.

Claims allowed - 7.

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3 The first figure refers to the number of the abstract, the second to the method of prospecting as indicated in the Table of Contents, and the third to the page.

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